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Attention to Thomas A. O'Rourke
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EXAMINER	
LEUNG, RICHARD L	

ART UNIT	PAPER NUMBER
3744	

DATE MAILED: 07/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/719,654	IRVINE ET AL.	
	Examiner	Art Unit	
	Richard L. Leung	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *33-76* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *33-76* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 April 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings were received on 15 April 2005. These drawings are not acceptable.

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the two or more augers recited in new claims 71, 72 and 76, and the impeller recited in new claims 73 and 74 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claims 33, 50, 55, and 65 are objected to because of the following informalities:

Regarding claim 33, the recitation of "volume of cryogen at it travels" is understood to be --volume of the cryogen as it travels--.

Regarding claim 50, the recitation of "claim33" is understood to be --claim 33--.

Regarding claim 55, the recitation of "a small volume" is understood to be --said small volume--. Furthermore, the recitation of "sufficiently liquid" is confusing. For the purpose of advancing prosecution, "sufficiently liquid" will be treated in this Office Action as being equivalent to having a suitable viscosity to be pumped or dripped.

Regarding claim 65, the recitation of "the gaseous encapsulation" is understood to be --the gaseous encapsulation around the unit--.

Appropriate corrections are required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 75 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had

possession of the claimed invention. The claim recites, "wherein the recycling system decreases internal currents being produced in said cryogen." Support for this limitation could not be found in the written description. Attention is particularly drawn to the second paragraph in "Summary of Invention" on page 7 of the present specification, which recites, "there may be internal currents created within the body of the cryogen...caused by the auger or other recycling system," thereby suggesting the opposite of what is being claimed. No clear example or explanation could be found in the written description that would enable one skilled in the art to create a recycling system that decreases the internal currents in the cryogen. However, this rejection may be overcome by explicitly pointing out where proper support is found in the original disclosure.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 54, 66 and 67 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 54, it is unclear what is meant by the recitation of "where the currents in the cryogen are allowed to function at full force," and no explicit explanation of this limitation could be found in the written description. In particular, the meaning of "function at full force" is not clearly defined. Accordingly, the claim is considered indefinite.

Regarding claims 66 and 67, it is unclear what is meant by the recitation of "at the interface between thermally dissimilar bodies." As best understood, this limitation refers to the interface between the cryogen and the frozen unit and the claim will be treated as such for the purpose of advancing prosecution. However, appropriate correction is still required to overcome this rejection.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 33, 34, 36, 39, 40, 42-44, 48-50, 52, 55, 56, 58, 59, 62-64, 68, 69, 73, and 74 are rejected under 35 U.S.C. 102(b) as being anticipated by US 4655047 (Temple et al.).

Regarding claim 33, Temple et al. disclose, as particularly depicted in Fig. 2, a process of manipulation and management of the motion and currents of a liquid cryogen utilized in the freezing or solidifying of individually small volumes of a liquid or units, characterized by transporting liquid cryogen (liquid nitrogen) from a reservoir 39 in a first direction upwardly from the reservoir 39 to a transition point (at weir 43) where the direction of flow of the cryogen changes to a second direction, managing the speed of travel and volume of the cryogen as it travels from the transition point to reduce gasification of the cryogen and any back eddies created in the flow of said cryogen caused by said change in direction, and introducing a liquid (e.g. liquid egg) to be frozen

by said cryogen while said cryogen is traveling in said second direction, said liquid being introduced via an orifice (nozzle) 34 at a distance remote from the cryogen (column 5, lines 18-23), such that the small volumes of said liquid form into frozen units (column 5, line 24).

Regarding claims 34 and 68, said units of said liquid are frozen in a desired shape, specifically pellets (column 5, line 24), and it is understood that the structure, shape, agglomeration and sizing of the individual frozen units formed from the liquid introduced into the cryogen can be predetermined and controlled by the manipulation and management of the cryogen (column 3, lines 46-50).

Regarding claims 36 and 39, there is a means for reducing the internal currents of the cryogen traveling in said second direction positioned prior to the introduction of the liquid to be frozen, said means comprising a dam (weir) 43.

Regarding claim 40, said first direction is a generally vertical direction (Fig. 2).

Regarding claims 42-44, 50, 58, and 59 said cryogen travels in a monodirectional manner along at least one raceway (trough) 32 when traveling in said second direction, said raceway 32 being sloped (Fig. 2). It is inherent that the slope of the raceway 32 controls the forward movement of the cryogen since the slope controls the gravitational force affecting the cryogen, and it is understood that the length of the raceway controls the retention time of the frozen unit in the cryogen because the frozen units must remain in the cryogen for the entire length of the raceway 32.

Regarding claims 48, 49, 62, and 63 manipulation and management of the motion and currents and particularly the forward motion of the cryogen is utilized to

move the gasification of the cryogen and the cavitations caused by gasification of the cryogen away from the introduction point of said liquid into said cryogen (column 2, lines 19-42). As best understood, any gasification of the cryogen away from the introduction point of the liquid into the cryogen would enhance (i.e. increase) the internal currents, as this would inherently introduce turbulence into the flow.

Regarding claim 64, it is understood that the manipulation and management of the motion and currents of the cryogen assist in dispersing the heat transferred from the units formed from the liquid to the cryogen because the flow of the cryogen in raceway 32 would necessarily transport heat away.

Regarding claims 52, 69, 73, and 74, the cryogenic liquid is recycled via a recycling system, said recycling system has an impeller 40 (column 5, lines 39-40), and it is described that impeller type systems provide a plurality of internal currents in the body of the cryogen (column 3, lines 4-9). Therefore, it is understood that the internal currents within said cryogen are multidirectional in nature prior to the introduction of said liquid to be frozen.

Regarding claims 55 and 56, said small volume of liquid is sufficiently liquid that it can be dripped or pumped through said small orifice 34, and said small volume of liquid may contain a percentage of solids (column 5, line 61 to column 6, line 16).

9. Claims 33, 34, 36-44, 47-52, 55-64, and 68-70 are rejected under 35 U.S.C. 102(b) as being anticipated by US 4479363 (Gibson et al.).

Regarding claim 33, Gibson et al. disclose a method for the manipulation and management of the motion and currents of a liquid cryogen utilized in the freezing or

solidifying of individually small volumes of a liquid comprising the steps of transporting liquid cryogen (liquid nitrogen) from a reservoir (sump) 34 in a first direction upwardly from the reservoir 34 to a transition point at reservoir 18 (column 9, lines 16-21) where the direction of flow of the cryogen then changes to a second direction. The speed of travel and volume of the cryogen as it travels from the transition point 18 to the is managed to reduce gasification and back eddies caused by the change in direction (column 9, 44-66; Fig. 6), and the small volumes of liquid to be frozen by the cryogen are introduced into the cryogen while said cryogen is traveling in said second direction via orifice (nozzles) 12 at a distance remote from the cryogen (column 10, lines 66-67), such that the small volumes of said liquid form into frozen units (column 11, lines 14-55; Fig. 8).

Regarding claims 34 and 68, Gibson et al. disclose that the units of said liquid are frozen in a desired shape, namely a spheroid shape (column 12, lines 62-66), and it is understood that the structure, shape, agglomeration and sizing of the individual units formed from the liquid introduced into the cryogen can be predetermined and controlled by the manipulation and management of the cryogen (column 11, lines 14-55).

Regarding claims 36-39, 52, 60, and 61, Gibson et al. disclose that the flow of cryogen at the transition point in reservoir 18 is turbulent, and therefore the internal currents within the cryogen are inherently multidirectional, and Gibson et al. further disclose a means for reducing said internal currents of the cryogen traveling in said second direction positioned prior to the introduction of the liquid to be frozen (i.e. means for making the flow of cryogen laminar), said means comprising a screen (perforate

plate) 103 and dam or baffle 20 (column 9, 44-66; Fig. 6). It is also understood that said reducing means can control the depth and forward motion of the cryogen since the dam or baffle 20 limits the amount of cryogen flowing into the raceway 22.

Regarding claim 40 Gibson et al. disclose that said first direction is a generally vertical direction since the liquid cryogen is moved upwardly, using a lift pump, from said reservoir 34 to transition point 18 (column 9, lines 16-21).

Regarding claim 41, Gibson et al. disclose that said second direction is generally a horizontal direction, as evidenced by the horizontal configuration of reservoir 18 through which the cryogen flows after being transported vertically from reservoir 34 (Figs. 2 and 6).

Regarding claims 42-44 and 57-59, Gibson et al. disclose that said cryogen travels along at least one raceway (trough) 22 when traveling in said second direction, said raceway being sloped (column 7, lines 35-46; Fig. 2) and comprising one or more channels 24 (column 9, lines 67-68; Fig 5) that would reduce the horizontal contact between frozen units that are traveling down the raceway 22. It is inherent that the slope of the raceway 22 controls the forward movement of the cryogen since the slope controls the gravitational force affecting the cryogen, and it is understood that the length of the raceway controls the retention time of the frozen unit in the cryogen because the frozen units must remain in the cryogen for the entire length of the raceway 22, and Gibson et al. suggests that the length of the channel should be selected so as to avoid freezing the entire mass of liquid (column 5, lines 20-22).

Regarding claim 47, Gibson et al. disclose that the cryogen has sufficient forward motion such that the frozen units formed in said cryogen are moved away from where said liquid is introduced to said cryogen so as not to contact subsequently formed units formed from said liquid (column 11, lines 14-55; Fig. 8).

Regarding claims 48, 49, and 62, while Gibson et al. fail to expressly disclose that the forward motion of the cryogen is utilized to move the gasification of said cryogen and the cavitations caused by gasification of said cryogen away from the introduction point of said liquid into said cryogen, these uses of said forward motion of the cryogen are believed to be inherent in the system. As the cryogen flows towards the downstream end of raceway 22, it is understood that the flow of cryogen would necessarily cause any gasification and cavitations in the cryogen to move towards the downstream end of raceway 22 and away from the introduction point of said liquid into said cryogen by virtue of the cryogen's bulk movement in that direction.

Regarding claims 50 and 51, it is understood that the cryogen moves in a monodirectional manner toward the downstream end of raceway 22 as it passes the introduction point of said liquid, and it is understood that the introduction point is of sufficient distance from the transition point that the cryogen is moving in a substantially horizontal direction since the flow by that point has been made horizontal and laminar by reservoir 18 and the dam/baffle 20 and screen 103.

Regarding claims 55 and 56, Gibson et al. disclose that said small volume of liquid to be frozen is sufficiently liquid (i.e. low viscosity) that it can be dripped or pumped through a small orifice (nozzle) 12 into said cryogen, and Gibson et al. disclose

that the liquid to be frozen may comprise a variety of substances that are known to inherently contain a percentage of solids, such as cottage cheese (column 1, lines 4-15).

Regarding claim 63, while Gibson et al. do not expressly disclose that the gasification away from the introduction point of the liquid into the cryogen enchances (i.e. increases) the internal currents in the cryogen, this is an inherent property in the system because any gasification, such as bubble formation, would introduce an element of turbulence into the flow of cryogen and necessarily create internal currents.

Regarding claim 64, it is understood that the manipulation and management of the motion and currents of the cryogen assist in dispersing the heat transferred from the units formed from the liquid to the cryogen because the flow of the cryogen in raceway 22 would necessarily transport heat away.

Regarding claim 69, Gibson et al. disclose that said cryogenic liquid is recycled via a recycling system, specifically that said cryogenic liquid after flowing through raceway 22 is separated from said frozen units via a rotary drum 28, drops onto a guide plate 32, and is returned to said reservoir 34 (column 7, line 52 - column 8, line 2), where said cryogen is recycled for use by said lift pump.

Regarding claim 70, while Gibson et al. specifically demonstrate the use of a bucket lift pump to transport the liquid cryogen from the reservoir 34 to the transition point at reservoir 18, Gibson et al. also expressly suggest that an Archimedean screw, which is equivalent to an auger, would be a suitable lift pump for use in the process (column 6, lines 14-22).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 4655047 (Temple et al.) in view of US 6555154 B2 (Jones et al.). As discussed above, Temple et al. disclose all the limitations of the claim except for expressly demonstrating that the shape of said frozen units of liquid is a "popcorn" structure, although Temple et al. do indicate that achieving popcorn structures is already known in the art (column 1, lines 44-47). Jones et al. teach a method for freezing a liquid substance comprising the steps of introducing a cryogen (refrigerant) 24 into a chamber 12 by way of inlet 26 and baffles 34, and introducing said liquid substance into said cryogen 24 by a feed assembly 40. Jones et al. further teach that the shape of the frozen liquid substance is a popcorn shape (Figs. 3a-3g; column 6, lines 27-30), which results from introducing relatively large globules of liquid into the cryogen. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed popcorn structures as taught by Jones et al. in the process disclosed by Temple et al. because these popcorn-shaped frozen product would be larger in size then the pellet units since they would comprise more material.

12. Claim 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4479363 (Gibson et al.) in view of US 4982577 (Milankov et al.). Gibson et al., as

discussed above, disclose all the limitations of the claim except that the raceway is a spiral raceway. Milankov et al. teach a similar method comprising transporting liquid cryogen from a reservoir 13 in a first direction upwardly from the reservoir 13 to a transition point via an auger (screw pump) 20 where the direction of flow of the cryogen changes to a second direction and introducing a liquid 27 to be frozen by said cryogen while said cryogen is traveling in said second direction, said liquid 27 being introduced via an orifice (nozzle) 30 at a distance remote from the cryogen, such that small volumes 32 of said liquid 27 form into frozen units. Milankov et al. further teach the use of a sloped spiral raceway (sluiceway) 16, and it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method disclosed by Gibson et al. to use a spiral raceway as taught by Milankov et al. because the spiral configuration would result in a more compact configuration and use less space when compared to the linear raceway of Gibson et al.

13. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 4479363 (Gibson et al.) in view of US 3228838 (Rinfret et al.). As discussed above, Gibson et al. disclose all the limitations of the claim except that said first raceway feeds said cryogen into a second raceway running in a substantially different direction from said first and second directions. Rinfret et al. teach a similar method wherein liquid cryogen is pumped upwardly from a reservoir E to an upper reservoir 10 wherein said cryogen changes to a second, generally horizontal direction and flows over weir 7 and into a first raceway (tray) 6 in which a liquid to be frozen is introduced via nozzles 3, said first raceway 6 subsequently feeding said cryogen into a second raceway (tray) 9,

in a cascaded manner, running in a substantially different direction from said first and second directions (column 8, lines 28-33; Fig. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method disclosed by Gibson et al. to use the cascaded raceway arrangement taught by Rinfret et al. because this configuration leads to a more compact structure than the single raceway used by Gibson et al. That is, by dividing the single raceway used by Gibson et al. into separate, cascaded raceways as taught by Rinfret et al., the overall length of the arrangement can be reduced.

14. Claims 53, 54 and 65-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4479363 (Gibson et al.) in view of US 4655047 (Temple et al.). Gibson et al. disclose all the limitations of the claims except for expressly demonstrating that currents at the point of introducing said liquid minimizes the gaseous encapsulation of the solidifying units and that the currents in the cryogen are allowed to function at full force. Temple et al. explicitly teach the use of currents, at full force as best understood, in a body of cryogen to reduce the gaseous encapsulation of units introduced into the cryogen, specifically indicating that the movement of the cryogen could be used to break up the gaseous bubbles surrounding the units (column 2, line 50 to column 3, line 31). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the currents in the cryogen, at full force, at the point of introducing said liquid to minimize the gaseous encapsulation of the solidifying units because Temple et al. teach that doing so would have prevented the solidifying units from floating on the surface of the cryogen because they would be less

buoyant once the gaseous bubbles are broken up (column 3, lines 15-20), and this would understandably increase the heat transfer between the units and the cryogen because the units would be totally submerged in the cryogen. It can be further appreciated that the dispersion of the heat transferred would necessarily reduce the gasification of the cryogen at the interface between thermally dissimilar bodies, i.e. between the cryogen and the solidifying units, because as best understood there would be less thermal energy around said units. In other words because the heat is dispersed, there is less heat available to cause the cryogen to vaporize. It is also understood that gasification only occurs in the cryogen, as this is where the bubbles are formed.

15. Claims 71 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 4479363 (Gibson et al.). As discussed above, Gibson et al. disclose all the limitations of the claims, except for using two or more augers to transport the liquid cryogen from the reservoir to the beginning of the raceway. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an additional auger since it has been held that the mere duplication of parts is well within the level of ordinary skill in the art and has no patentable significance unless unexpected results are produced. *In re Harza*, 274 F.2d 669, 671, 124 USPQ 378, 380 (CCPA 1960). Furthermore, it is inherent that any additional auger would increase the internal current in the cryogen because it would be another source of flow and turbulence.

16. Claim 75 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 4479363 (Gibson et al.) in view of US 6216470 B1 (Kosock et al.). As discussed above, Gibson et al. disclose all the limitations of the claim except that the recycling system decreases the internal currents being produced in said cryogen. Kosock et al. teach a similar method comprising introducing a liquid to be frozen via a feed device 4 into a flow of cryogen in a channel 5, separating said cryogen from said frozen liquid by a means 7, flowing said separated cryogen via channel 6 into a reservoir 1, and recycling said cryogen from said reservoir 1 to said channel 5 by a recycling system (pump) 2. Kosock et al. further teach that said cryogen is recycled such that a laminar flow of said cryogen is obtained (column 3, lines 49-54). Since said flow is laminar, it is understood that the internal currents produced in said cryogen are decreased. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method disclosed by Gibson et al. such that the recycling system decreases the internal currents being produced in said cryogen, as taught by Kosock et al., because this would have improved the transport of said liquid cryogen and reduced the amount of said liquid cryogen that vaporizes.

17. Claim 76 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 4479363 (Gibson et al.). Gibson et al. disclose a method for the manipulation and management of the motion and currents of a liquid cryogen utilized in the freezing or solidifying of individually small volumes of a liquid or units, characterized by transporting the liquid cryogen (liquid nitrogen) from a reservoir 34 in a first direction (upwards) to a transition point at reservoir 18 by means of a lift pump (column 8, line 67 to column 9,

line 1), changing the direction of travel of the cryogen at said transition point to a second direction of travel (Fig. 2), managing the speed of travel and volume of cryogen from the transition point by the use of a means for reducing internal currents of the cryogen to reduce gasification of the cryogen and any back eddies created in the flow of said cryogen caused by said change of direction (column 9, lines 44-66), introducing a liquid to be frozen by said cryogen while said cryogen is traveling in said second direction and after said cryogen has passed said means for reducing, said liquid being introduced via an orifice (nozzle) 12 at a distance remote from the cryogen (column 10, lines 66-67), such that the small volumes of said liquid form into frozen units (column 11, lines 14-55; Fig. 8). While Gibson et al. further disclose that said lift pump could be an Archimedean screw (column 6, lines 14-17), which is equivalent to an auger, Gibson et al. fail to disclose the use of two or more such augers. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an additional auger since it has been held that the mere duplication of parts is well within the level of ordinary skill in the art and has no patentable significance unless unexpected results are produced. *In re Harza*, 274 F.2d 669, 671, 124 USPQ 378, 380 (CCPA 1960).

Response to Arguments

18. Applicants' arguments filed 15 April 2005 have been fully considered but they are not persuasive.

Applicants assert that Gibson et al. fail to disclose an arrangement comprising the transport of liquid cryogen from a reservoir in a first direction upwardly from the

reservoir to a transition point where the flow of cryogen changes to a second direction, specifically stating that "Gibson has a reservoir 18 with a baffle 20 therein...There is no change in direction of flow of cryogen after it leaves the reservoir..." (Remarks, page 17, third paragraph). Applicants' assessment of Gibson et al., however, completely disregards the initial vertical transport of cryogen from sump 34 to reservoir 18 as discussed in the previous Office Action (9 November 2004) and again in the rejections above. That is, Gibson et al. clearly demonstrate a process wherein liquid cryogen is transported upwardly from a reservoir (sump) 34 to said reservoir 18 in which the cryogen changes into a horizontal direction. Refer to column 8, line 67 to column 9, 21 and Fig. 2. Accordingly, Applicants' argument is not persuasive.

Applicants similarly assert that Rinfret et al. fail to disclose the recited change in direction. Applicants assessment of Rinfret et al. again fails to recognize the step wherein the liquid cryogen is pumped vertically from a reservoir E to the upper reservoir 10 wherein the cryogen changes to a second, horizontal direction. Refer to column 7, line 72 to column 8, line 38 and Fig. 1. Applicants further assert that Rinfret et al. fail to disclose a means for reducing the internal currents of the cryogen traveling in the second direction. Applicants' attention is drawn to the disclosure of a weir 7, which is used to provide a cushion of liquid refrigerant (column 8, lines 29-30; Fig. 1) and performs the same function as a dam. Accordingly, Applicants' arguments are not persuasive. Furthermore, Applicants' arguments are not deemed relevant because Rinfret et al. is now only relied upon for teaching the cascaded raceway arrangement.

Applicants assert that Milankov et al. does not teach or suggest the concept of managing the speed of travel and volume of cryogen as it travels from the transition point. Applicants argument is not considered relevant since Milankov et al. is only relied upon for teaching the use of a spiral raceway.

Applicants assert that Kosock et al. do not appreciate the concept of managing the speed of travel and volume of cryogen as it travels from the transition point, or that such management can reduce gasification and back eddies created in the flow. Applicants specifically indicate that, "This is particularly true in Kosock where the cryogen falls out of the opening in the tube extending from the pump. There is clearly no control of any gasification or back eddies in the arrangement shown in this patent," (Remarks, page 18, second full paragraph). The Examiner respectfully disagrees. Applicants' assessment of Kosock et al. appears to be based upon the generalized diagram in Fig. 1 and disregards the written description that explicitly teaches the formation of a laminar flow. Referring to column 3, lines 49-54, Kosock et al. disclose, "By means of a pump 2, the liquefied, low-boiling cooling medium, via a channel 5 open at the top and arranged horizontally or downwards at an angle, is delivered from the storage reservoir 1 in such a way that a laminar flow of the cooling medium is obtained on the channel 5." Accordingly, Applicants' argument is not persuasive.

Applicants further assert that none of the cited references disclose the use of augers as is provided in claim 76, that is, the use of two or more augers to transport the liquid cryogen from a reservoir to a transition point. Gibson et al., as well as Milankov et al., disclose the use of only a single auger. However as discussed in the rejection

above, claim 76 is not considered patentable because the use of two or more augers merely reflects a duplication of parts, which has been held to be well within the knowledge of one of ordinary skill in the art. *In re Harza*, 274 F.2d 669, 671, 124 USPQ 378, 380 (CCPA 1960). Accordingly, Applicants argument is not persuasive.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 3768272 (Barrett): discloses a device for direct contact freezing comprising a circulating refrigerant.

US 3857974 (Aref et al.): discloses a process for freezing liquid egg into popcorn structures.

US 5881561 (Viard): discloses a device and process for freezing fluid substances into uniform pellets.

20. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard L. Leung whose telephone number is 571-272-4811. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl J. Tyler can be reached on 571-272-4834. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Richard L. Leung
Examiner
Art Unit 3744

CHERYL TYLER
SUPERVISORY PATENT EXAMINER

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